

Mobile User Engagement: New Apps versus Mainstream Apps

A Dissertation Presented

By

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ABSTRACT

At a time when there are millions of mobile applications available, the app market has evolved to one of the most competitive ones in recent history. Companies strive to acquire, retain and grow their user base, as it is often a direct contributor to company sustainability.

During this time, the market has been dominated by giants and the competition has been extremely fierce to companies which just launched their brand-new applications into the market. So, the search for different and efficient strategies has been focused on which can increase user engagement in mobile applications and how that can be achieved. However, while some research analyzes engagement factors for mobile apps, no studies were found that focused on how new apps can manage their user engagement to compete with mainstream, market leader apps.

With this significant gap in mind, this dissertation has the main goal of evaluating which factors influence user engagement, defining which factors exhibit the highest positive impact, and uncovering which are the most relevant ones that influence how users engage with new apps.

The obtained results point out that the referred factors in the literature are overall accurate in today's environment, and keep being important to users. Adding to that, some factors, such as the Focused Attention, Positive Affect, Endurability and Novelty, were found to be the main determinants of user engagement in mobile social apps. When focusing on new social applications, one-on-one interviews with several mobile users led to the discovery that the factors that are most relevant to users are the User Context and Novelty. Special focus was found on the interactivity with friends and the innovation, both considerable determinants on users' willingness to try new apps and actively engage with them.

The whole of the insights gathered from the research, when framed with the existing literature, indicate that some strategies can be employed to support the development of new applications, and ensure that, in a market dominated by Goliaths, quite a few "Davids" may still have their say.

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1. INTRODUCTION

1.1. Background

This document details the final dissertation of the Master's degree in Innovation and Technological Entrepreneurship.

The mobile market has been growing at a significant pace, and the upsurge in supply of mobile apps has made this market extremely competitive. Companies strive to acquire, retain and grow their user bases, and many companies are directly dependent on their own capability to guarantee a growing number of active users. As these companies search for differentiation strategies, multiple research has been focused in studying user engagement and the factors that influence how users engage with mobile apps.

This study then has the main objectives of evaluating which factors influence user engagement, defining which factors exhibit the highest positive impact in user engagement and defining which are the most relevant factors that enable new apps to compete with mainstream apps.

1.2. Motivation

Since I'm a part of an entrepreneurial team that is developing a mobile app, user engagement is a subject for which I have a great deal of interest. As mobile user engagement is a decisive factor of a mobile product's survival in the marketplace, this is a study of extreme importance and relevance in order to foster this project's success. This research will then be valuable to my entrepreneurial role in the project and to add to my own knowledge and experience. Even more so, the process of conducting this research will allow me to interact with mobile users and gain some knowledge into how people behave, in the real world, when using mobile apps, and this personal interaction will also be a relevant experience.

Additionally, motivation to partake on this research topic is significantly influenced by the fact that user experience and user engagement are two trending subjects in the mobile app industry. Both are object of open discussion, as they play a relevant part in the launch and growth of successful mobile apps found in the market today. The pertinence of studies on user engagement, specifically when framed into a dimension of new mobile apps, stands unquestioned, and it adds to my own motivation knowing that this present study may be of help not only to my personal knowledge and experience, but to other entrepreneurs and start-ups as well.

1.3. Dissertation Outline

This dissertation is divided in 6 chapters.

The first is the introduction where the context, goal and motivations of this study are presented.

The second chapter refers to the literature review, where relevant definitions and knowledge regarding user engagement and mobile applications are presented. This serves as a major support and basis for the dissertation, and enabled the finding of a research gap, that will be the main objective of the dissertation.

In the third chapter, the methodology, all the procedures and decisions about the practical part of this study are presented, from the creation of questions to how the results were analyzed.

The fourth section comprises the presentation and discussion of obtained results, with visual aids. The obtained results will be critically analyzed, framed with pertinent research and overall used towards the main goal of the study. It is also where first-hand main proposition will be put forward, opening debate around them.

The fifth chapter is a sum-up of main findings, focusing on the main reasoning, as well as stressing the limitations of the present study and recommendations for future research.

In the sixth chapter, all sources that are cited throughout the dissertation are listed, and the sixth and last section is also a support one, showcasing the annexes that help contextualize the results and discussion.

2. LITERATURE REVIEW

2.1. Methods of Literature review

Research was conducted in Scopus during November 2016, with search for relevant keywords, which resulted in finding 82 articles surrounding user engagement. These articles were screened and the most relevant ones were analyzed in detail, in order to gain relevant information to frame the proposed research. There was also a need to search other databases for articles surrounding the research topic, such as Google Scholar, which allowed searching for more specific concepts that were needed to back up the literature review. This more specific research took place during December 2016.

The literature analyzed was limited almost exclusively to articles published after 2007. This restriction was included in purpose, as the app market and consequent user technologic lifestyle started and grew significantly around 2008 (Carare, 2012), as will be presented during the course of the literature review, which means literature before this can be considered already obsolete and not corresponding to the current reality.

2.2. Mobile app market

The mobile app market is a fairly recent one, and one whose history is deeply interconnected with technological advances in mobile phones. Although mobile phones going as early as 1994 already had some built-in applications with basic functions (such as calculator, calendar, address book, games, among others), these were mainly regarded as built-in features and not standalone applications. In the following years, mobile devices evolved steadily, but without major revolutions in technology. Here, the advent of air-interface standards such as GSM and CDMA was crucial. These networks effectively meant that mobile Internet was a possibility, bringing this utility to the reach of millions of mobile phone users (Funk & Methe, 2001). At this time, the absolute domain over mobile services was restricted to mobile network operators and phone manufacturers, and still business models regarding mobile platforms were beginning to take on different approaches, as the widespread use of the Internet, email, browsers, portals and online applications was urging ICT companies to design sustainable business models for these platforms, in a fierce battle for leadership (Ballon, Walravens, Spedalieri, & Venezia, 2008).

Then, in 2007, Apple revolutionized the mobile phone concept with the release of the first-ever smartphone, the iPhone. As previous generation devices, it featured built-in applications, but was a pioneer in opening the door to the use of third-party apps. The launch of iPhone's software development kit meant that any developer could create and launch his own application for iOS – Apple's proprietary operating system – which could be installed and used in any iPhone across the globe.

Apple reaffirmed the importance that app developers had to its market strategy, by launching Apple's App store. This event was significant, as it marked the inauguration of a worldwide app distribution channel that would ensure the easy access of smartphone users to all available apps. It also put forward an enticing value proposition to both developers and software companies, by making available a very cheap channel of distribution that, no matter the scale, was kept at accessible rates. At this stage, it can be considered that the mobile app industry was effectively born (de Reuver & Haaker, 2009; Shah, 2016).

As described by Holzer & Ondrus (2011), the mobile application market is two-sided. In one side, there are the consumers; on the other, there are the developers. In a market such as this one, a significant alteration to one side of the market induces a comparable effect on the other. Considering this, when there is a sudden increase in the number of consumers, for a specific platform or mobile device, a similar increase on the number of developers is expected, as this creates an attractive market. The contrary is also valid: with cumulative numbers of developers and mobile application releases, the higher number of existing applications serve as an enticement for more users to join the platform or device, again in a positive feedback mechanism.

Media coverage of this significant milestone in the mobile phone industry quickly made iPhone sales exceed all expectations, putting these novel apps, for the first time, in the hands of users. The App Store itself made the process of searching and installing applications so intuitive, that application downloads

skyrocketed, with 10 million downloads in 3 days (Apple, 2008). This huge demand of mobile apps served to emphasize just how big the opportunity was in this new market, and it is no surprise that competition was soon to follow.

Shortly after this remarkable period, Google, a worldwide giant of the technological industry, made the decision to enter the smartphone market with its proprietary operating system – Android – and its own distribution channel – Google Play Store. Apple's complete domain on the smartphone market quickly vanished, as Android presented a wider range of devices and, unlike Apple, proposed affordable options. Between iOS and Android, the smartphone market offer was meeting the demand (Gandhewar & Sheikh, 2010).

As an increasing number of users began to own smartphones (from 122 million in 2007 to 2.3 billion in 2017) (Statista, 2017a), there was an exponential increase in the number of available apps to fulfill this need (from around 23.000 in 2008 to over 5 million in 2016 (Statista, 2016b, 2016c). Smartphone apps effectively surpassed their predecessors in any given level, quickly proving to be suitable substitutes to otherwise desktop-only apps. Email, games, instant messaging services, social media and productivity tools were no more one-platform, and this birth of the multi-device concept meant that users could do on-the-go multiple activities that were not possible before (Anthes, 2011; Han Rebekah Wong, 2012; Islam & Mazumder, 2010).

This rapid increase of the total number of available mobile apps quickly led to a market saturation. Developers, amassed by the millions, were releasing more apps that could ever be downloaded, and the once desirable blue ocean was now tainted in red. Alarming reports began emerging, calling to attention to this phenomenon. As of 2012, from the 650,000 available apps on the App Store, a staggering 400,000 – or 60% – had never been downloaded but once. This report, by analytical firm Adeven, focused on the difficulties this posed for smaller app developers, which, without the financial capabilities of app market leaders, were often venturing into an impossible battle (Fletcher, 2012).

This issue has stood to the present day: while numerous apps sprout every day, only a small number of them do ever thrive in the middle of such aggressive competition. Recent estimates suggest that the financial success rate for mobile apps is around 0.01%, as most mobile applications fail to produce a significant number of downloads, retain users and generate consistent and significant revenue streams (Gartner, 2014; Meyer, 2012; Perro, 2016).

The mobile market panorama has, without question, drastically changed in less than 10 years. While this market is still increasing in value – grossing \$45 billion in 2016 and expected to reach \$81 billion by 2020 (Warman, 2016) – developers now have to overcome increasingly difficult challenges to succeed in the market.

2.3. Mainstream and new apps

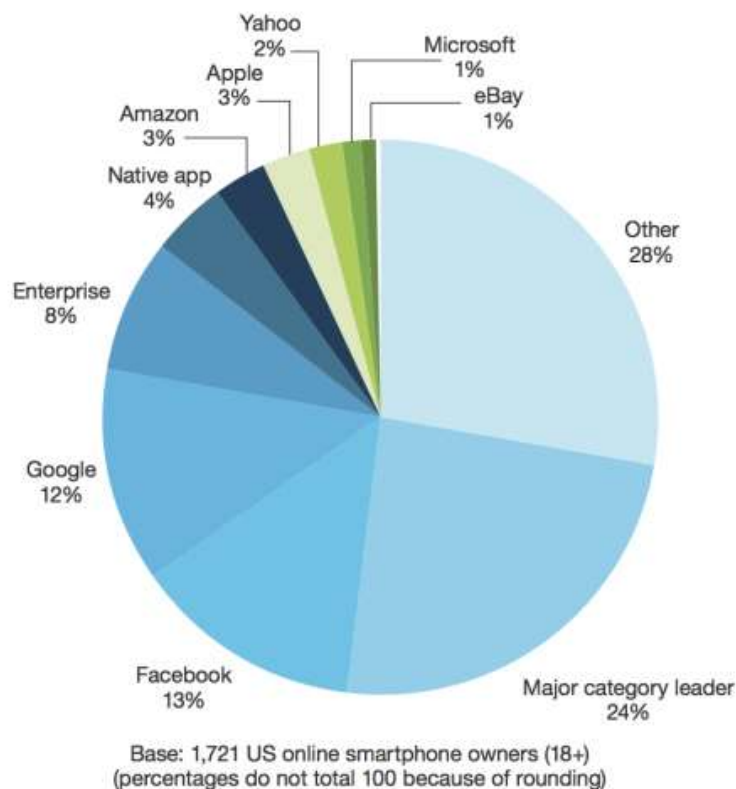
The several factors presented in the previous section have led the mobile app market to become very heterogeneous: while 60% of apps in app stores have nearly no downloads (Meyer, 2012), a very restrict number of apps have become market giants. These apps have been amassing users by the millions, and with a clear tendency to continue this increase of their user base, year after year. Some examples are Facebook, with 1.66 billion monthly active users (Facebook, 2016), Facebook Messenger, with 1 billion (Statista, 2016a), YouTube, with over 1 billion (Youtube, 2016), Instagram, with 600 million users (Instagram, 2016), and Candy Crush, with 166 million (Dreunen, 2016). Considering a universe of 2.3 billion smartphone users at the present date, the absolute dominance of market share from these apps becomes self-evident (Statista, 2017a).

But heterogeneities in the mobile app market do not stop on the absolute number of app users. By looking at how mobile users themselves behave, gaps between mainstream apps and recent apps begin to take shape. Several reports indicate that mobile users tend to use apps differently: while the average 90-day churn rate (percentage of users that stop using an app) for all mobile apps is 75%, this figure drops to 50% for top performing apps (the ones with more than 1 million monthly active users). In other words, apps with a gigantic user base appear to be keeping their users much more engaged than the market average (Perro, 2016). Further dissecting this apparent market dominance, recent behavior analyses put the real-world app

usage of mobile users into scrutiny. Findings were surprising: while users spend 85% of their mobile time in apps, and while they have several apps installed on the smartphone at a given moment in time, 78% of users were shown to only use three or less apps on a daily basis, condensing their engagement into a very small number of applications (AppAnnie, 2016; Boyle, 2017).

Users' expectations towards mobile apps has also been shown to strongly influence how a new app's launch can quickly become limited. Mainstream apps are so widespread and used by an incredible amount of smartphone owners that strangers to these apps quickly form their own expectations and begin to understand the app's logic long before they may try it. As becomes clear, this is not the case for new apps. Users' short attention spans and disinclination to use several different apps puts a new app's ability to create a good impression into a high stake (Holmboe, 2014). Expectations are simply not there, and new apps need to figure out ways to clearly showcase their concept, and make usability clear for every potential new user. This process, labeled as "onboarding", has seen a rising interest with the increased competitiveness of the mobile market, and has since become a significant factor in new app development (Noel, 2015).

Some market analyses, such as the one presented by Forrester (2014), also pinpoint how a handful of companies are able to dominate time spent in apps, with major category leaders getting 24% of the total share, and companies like Facebook and Google getting 13% and 12%, respectively. These findings are further detailed on **Figure 1** below.



Source: Forrester's US Consumer Technographics® Behavioral Study, October 2014 to December 2014

Figure 1. Share of US minutes spent on apps owned by major tech companies.

The way the market sits right now, new app developers not only need to compete with similar apps and market leaders (mainstream apps), but also to fight for mobile app users' time (Lella, Lipsman, & Martin, 2015). Overall, the scenario for new app developers is not a favorable one, as they face numerous challenges, needing to finance development of apps and business with very low probability of success. While that may be the case, several start-ups have successfully launched and grown their apps into profitable businesses, and case studies around these success stories make up for an interesting read.

Success stories range from the one-man efforts to the more complex structured apps, such as "Snapchat". Each in their own way, they showcased that, even among goliaths, independent app developers

and start-ups were able to top the charts. Independent app developer Chad Mureta single handedly launched the simple “Emoji” app, and quickly raked in 20 million downloads. According to Mureta, the app’s principle was nothing new, but it was built around making emoticons more accessible to users. Mobile users felt the need to communicate using the emoticons, and his app allowed any of these to be quickly sent in an email or text message, which meant that users kept coming back to the app (Ziegler, 2013). The example of “Snapchat” is a noteworthy one, as the app was able to rise among social media giants, being the fourth most used mobile social app in the United States, as of 2017 (Statista, 2017c). Released in late 2011, the app came from the minds of former Stanford University students with little experience on the market. After months of focusing on usability and delivering high value to their users, the app quickly began to gain traction (Colao, 2012). As it reached teenagers, it spread like wildfire and became one of the top 5 photo sharing apps. As Taylor (2013) discusses, Snapchat’s growth engine was not solely based on the strong word of mouth effect it triggered, but essentially due to how users interacted with the app. The thrill of receiving and sharing intriguing and disposable content was enough to fuel a continuous, heavy usage of the app, and this ever-growing user engagement quickly led the company to 300 million monthly active users (Statista, 2017b) and a \$25 billion valuation (Ovide & Molla, 2016).

Both these case studies, together with several others alike, not only serve their purpose by painting a picture of hope for new app developers, but for shedding insights into what key success ingredients should be part of the app itself. Without exception, understanding how users use the app sits at the core of every successful new app, and this has led new app developers to realize that, as their business’ survival is strongly dependent on their ability to grow the number of active users, it is overall reliant on a single factor: user engagement.

2.4. The Nature of Engagement

To determine how mobile applications can stimulate user engagement, it is necessary to understand what user engagement is and which key attributes make up engagement. The definition of engage, according to Random House Dictionary, is “to occupy the attention or efforts of”, “to attract, hold fast or please” and “become involved”. These general keywords were also object of study by Chapman (1997) and they can be applied in numerous subjects, but overall represent what engagement stands for.

Several studies have ventured deep into the conceptual dimension of engagement. Schaufeli, Salanova, Gon Alez-ro, & Bakker (2002) argued that engagement should be regarded as a persistent and pervasive cognitive affective state, not a time-specific state. Other authors also discuss that engagement can be characterized by its inherent energy, involvement and efficacy, all factors that contradict exhaustion, loss of meaning and loss of fulfillment (Maslach, Schaufeli, & Leiter, 2001). These conceptual discussions quickly became of increased interest, with the rise of consumer technologies.

Kuutti (2001) described the evolution of human interaction with computers and web platforms, with a special focus on the role of interactions between man and software, and their pivotal roles in education, purchasing, entertainment and social interaction. The advent of the Web 2.0 transformed the landscape of these interactions, bringing content to a central position. The quality of content and its ability to generate valuable experiences became a must in times of flooding possibilities, and the focus quickly went to engaging users (Karat, 2004; O’Brien & Toms, 2008).

The previous section raised the understanding of how user engagement can be essential to a mobile application’s success. Users’ behavior has an impact on the churn rate, and also presents implications on the company’s intent of growing of a user base, since a single user can influence several other users to try an app, which is an important factor for the growth of the company. Not only does it matter in terms of getting visibility and growing a user base, it is also essential from a business perspective, since users’ actions online – like clicking, commenting and sharing – have an impact on important behaviors to the application, such as purchasing or donating. As it stands, an increase in user engagement can result in a rise in revenues and app growth (Permadi & Rafi, 2015; Valenzuela, Park, & Kee, 2009).

As the realization of the significance of user engagement moved towards becoming *status quo*, companies brought this concept into their core business strategy. By stimulating high levels of interaction and involvement, companies were able to start creating more meaningful and long-lasting relationships with

their customers, which can serve as a considerable gain for the business' long-term sustainability (Kumar et al., 2010; Revels, Tojib, & Tsarenko, 2010).

Research on human behavior motivations branched towards the mobile app domain, with novel research analyzing the potential strategies for mobile apps to engage users. As reported by Watcher, Kim, & Kim (2012), some of these emerging studies have focused on analyzing users' behaviors, and started to uncover a series of relevant factors, some more technological and some more user-centered. As these studies argued, engagement should not be narrowed down to a definition based on task completion alone, since, when applied to users, this definition can be more specific. According to Attfield, Kazai, & Almas (2011), "User engagement is the emotional, cognitive and behavioral connection that exists, at any point in time and possibly over time, between a user and a resource". A broad definition that, according to the authors, deliberately emphasizes the importance of a holistic view, considering all these dimensions at once. This behavioral connection can be visualized through the time spent, intensity of effort and concentration and propensity to start and stay in the task; the emotional dimensions is linked to enthusiasm, interest, and curiosity users have; and the cognitive element relates to the perceived actions and users' knowledge of their importance.

Given the suggested approach to a broad, inclusive definition of engagement, the question arises if it does apply to the massive variety of mobile apps in the market. According to O'Brien & Toms (2008) user engagement remains consistent over different types of mobile applications (video-games, online shopping, webcasting and web searching), which proposes that the factors that influence it, as well as the users' path through the process, should be equivalent regardless of the app category. However, Attfield et al. (2011) considered a new vision: different applications have different characteristics and different targets, which means the properties of engagement may differ from one type of application to another.

2.5. Factors of User Engagement

The urge to understand the drivers behind users' engagement with mobile apps has been a constant of the last few years. During this period, several authors have been trying to come up with a set of key factors that make up engagement, and these have already been extensively analyzed in the literature. To this extent, Table 1 presents an overview of these factors, and it will serve the purpose of understanding if there is already a consensus in the literature about what are the main factors that influence engagement. These factors are detailed below.

FOCUSED ATTENTION – this factor, first put to light by Matlin (1994), is inherently related to human cognition, and presents both a physical and social dimension. Focused attention is based on users' consciousness of the physical environment – also defined as attention factor. This concerns users' intensity of concentration in the application and losing the consciousness of the surroundings, both objects and people (O'Brien & Toms, 2008). This loss of consciousness has strong implications on the distortion of the perception of time. A highly engaged user is more likely to not be aware of the passage of time, an effect that Baldauf, Burgard, & Wittmann (2009) argued was a strong signal of cognitive involvement. Adding to this dimension, the work of Csikszentmihalyi (1990) studied the idea of an optimal experience, identifying, besides the effect of distortion of time perceptions, the importance of concentration and loss of self-consciousness, and proposing the concept of "flow" – a mental instance where the user feels complete immersion in the task they are performing.

POSITIVE AFFECT – users' emotional interest and involvement to enter the application's environment is discussed as one of the major drivers of engagement, as engaged users are frequently found to be affectively involved with the app (O'Brien & Toms, 2008). As the study by Jennings (2000) puts it, this affect is seen as an emotional investment the user makes, and one which helps create a personal connection to the experience at hand. Other authors, such as Vreede et al. (2013) showed consensus towards this claim. This investment is seen as one of the major contributors to customer loyalty, which is going to be addressed in the Endurability factor, found below.

AESTHETICS – the aforementioned study by Jennings (2000) also went through the importance of aesthetics towards user engagement. According to the author, this represents the visual beauty, as well as the pleasing visual components found on the platform. Some authors pinpoint that this visual dimension has a strong contribution to users' first impressions of the platform (Lindgaard, Fernandes, Dudek, & Brown, 2006), while others found that aesthetic appeal was found to be positively correlated to perceived usability (Tractinsky, Katz, & Ikar, 2000). Studies that evaluated the importance of aesthetics to mobile app engagement found that general factors, such as symmetry and balance, as well as specific issues, like graphics and screen layout, were strong contributors of user engagement (O'Brien & Toms, 2008).

ENDURABILITY – as mentioned above, durability is strongly linked to the concept of user loyalty. This factor refers to users' likelihood to remembering and wanting to repeat a past experience that brought them enjoyment, usefulness or any other type of value. When users have an extraordinary experience in an application, this can create a lasting positive memory – also referred to as the Pollyanna principle – that will entice them to continue using it (Read, Macfarlane, & Casey, 2002). Other studies linked durability with a user's disposition towards proactively recommending their own experience to others, and framed durability to the concept of self-fulfillment after completing a task (Jung & Lee, 2016; O'Brien & Toms, 2010). Another study by the same authors had previously been able to link the concept of re-engagement – another take on durability – to experiences where users had been able to discover something new, getting incentives, getting rewards in the form of convenience or just outright having fun (O'Brien & Toms, 2008). This same study also made mention of a “sub-factor” of durability: the platform's interactivity, or the level of exchange of information between the user and the system (application). Here, engagement was expressed by the interaction of the users through their experiences with the application's content. More recent studies have put the concept of “gamification” under analysis, when assessment how social media users tend to re-engage with these platforms (Jung & Lee, 2016). The issue of gamification is explored below, and the notion of re-engagement will also be further developed.

NOVELTY - a new, unexpected or unfamiliar thing or experience can be perceived as valuable to users, contributing to their engagement in interactive scenarios. Research on affective design found that sudden, unexpected visual or auditory changes were prone on causing joyful, exciting or alarming experiences to end-users (Aboulafia & Bannon, 2004). Huang (2003) also defined novelty as the introduction of features, in a given interface, that were able to surprise users, and present new and unfamiliar scenarios, as well as the addition of fresh content. This dimension was also part of the scope of the research by O'Brien & Toms (2008), and other authors such as Vreede et al. (2013), that found a significant link between novelty aspects and overall engagement. However, these also stress the importance of weighing novelty with its counterpart – familiarity – as high degrees of novelty can lead users to “become lost” and confused when using the application.

RICHNESS AND CONTROL – as its designation implies, this factor comes twofold. The richness component is a representation of the potential of growth of an activity, by the assessment of the diversity of users' thoughts, awareness and activities when involved with it. Higher levels of variety and complexity are linked to the overall level of perceived richness of the activity. Control, on the other hand, is a measure of the user's ability to achieve the growth potential – i.e., the ability to take advantage of all existing possibilities, despite their complexity – by measuring how much of an effort the user has to make to be able to accomplish it. By the development of a framework of “Richness, Control and Engagement”, it was found that perceived richness and perceived control both had a significant and positive effect towards overall user engagement. However so, this framework also pinpointed the importance of striking a balance between the number of product features, as such an increase has positive effects on the richness component, but negative effects on the perception of control (Rozendaal, Keyson, & de Ridder, 2009). Coming from a different point of view, O'Brien & Toms (2008) analyzed the effect of an intellectual challenge or stimulation through the content of an application. The authors found this was presenting a pleasurable experience for users, as sense of accomplishment was a trigger of overall satisfaction and personal fulfillment, both positive contributors to overall engagement. Additionally, and as referenced above,

gamification strategies, now widely debated for social and entertainment apps, have also been shown to work for users, as they are able to stimulate challenges, getting users involved in overcoming them, and often getting some sort of achievements in return (Jung & Lee, 2016).

REPUTATION, TRUST AND EXPECTATION – This threefold dimension of engagement presents trust as a requirement for attaining user engagement. The factor is built upon the technological-dependent assurances, such as encryption of data, and is also co-dependent on companies’ and users’ attitudes towards applying that technology. This rationale, presented by Khare & Rifkin (1997), put forward the urge to reaching a “web of trust”, stating that this trust is overall modeled by principles (being specific to the privileges granted to users, being able to vouch for the claim, and acting carefully); principals (the set of assertions from both parties that lead to permission); policies (grant of permissions based on the identity of the requiring party); and pragmatics (the existence of standard protocols, formats and application programming interfaces that overall represent principals and policies). Mui, Mohtashemi, & Halberstadt (2002) linked the notion of trust to that of reputation and expectations, claiming that trust is an inherent expectation the user has regarding the expected behavior of another party, based on the history of their past interactions. Framing this concern in the scope of online transactions, they found that reputation is a social quantity that derives from actions of the transaction handler, and that was directly linked to users’ likelihood to trust it. Then, organizations rely on the confidence customers have in the provided service, as it is a predictor of how users will engage with it. In the context of social networks, trust has been discussed from the standpoint of the reliability of user-generated content (UGC), as perceived by other users in the same network. This issue, addressed by Golbeck (2008), concerned how social network users could trust one another, stating that social trust relationships can change how users engage with online platforms. In more recent studies, Tsikerdekis & Zeadally (2014) also debated how online deception was shaping the trust of users in social media platforms, as fake profiles and fake content were overall acting as distrusting agents to users, and producing negative effects on user engagement.

USER CONTEXT – while several aforementioned factors tend to center on the context of the platform when analyzing its impact on user engagement, user context takes into account how the user’s specific state can shape how engagement takes place. As a first player in this dimension, the context of the user states that real engagement is not measurable in controlled laboratory tests, since the real-world state of the user can vary greatly, and users themselves agree that their engagement is dynamic, subjective and context-dependent (Law et al., 2009). Additional research on the matter of context has unveiled two sub-dimensions: incentives and motivations. Incentives are shown as a measure on how a platform can entice a user to continuously engage with it. Internal incentives – such as users’ interest (personal preferences), personality, social context, influence of trends, perceived “coolness” or fun, and social norms and values – can have a big variation from user to user, and so cannot be readily controlled by app developers. However, by ensuring an app is designed to match the known interests of a specific target market, this user interest can be somewhat matched. External incentives, such as rewards in a game, can also act as additional triggers to engage users and keep them interested in the application. By instigating gamification elements, much like was discussed in the previous factors, app developers can present incentives to users in a non-intrusive way, acting towards increased engagement. Authors such as Klem & Connell (2004) and Vreede et al. (2013) have accounted for the internal incentives (users’ interest), Jung & Lee (2016) and O’Brien & Toms (2008) took into account also the external incentives. Users’ motivations to have an experience and/or finish a task were found to be one of the most common emotions to users regarding engagement with applications. This was discussed by authors that consider motivation an important factor to engage users (Vreede et al., 2013).

The analysis of the literature allows the creation of a matrix, where the attributes of user engagement presented by the analyzed articles can be clearly presented and compared (**Table 1**).

Table 1. Matrix of the literature's analysis, concerning the different factors of engagement identified by the authors.

	Factors of engagement							
Article	Focused Attention	Positive Affect	Aesthetics	Endurability	Novelty	Richness and Control	Reputation, Trust and Expectation	User context
O'Brien & Toms (2008)	✓	✓	✓	✓	✓	✓	✓	✓
O'Brien & Toms (2010)	✓		✓	✓	✓			
Jung & Lee (2016)	✓	✓		✓		✓	✓	✓
Vreede et al. (2013)	✓	✓		✓	✓			✓
Attfield et al. (2011)	✓	✓	✓	✓	✓	✓	✓	✓
Klem & Connell (2004)	✓	✓		✓		✓		✓

Analyzing this table, it can be stated that most of the factors presented were taken into account by almost every author. It is unlikely that this happens purely by accident; in fact, the consistency of these factors across several authors in this field of study suggests that these are the most consensual pillars of user engagement and, as so, must be considered in this research.

However, apart from the consensual ones, these same authors identified divergent factors that shouldn't be automatically discarded. O'Brien & Toms (2008) and Attfield et al. (2011) determined that aesthetics/sensory appeal can be essential to engage users, since the visual appeal of an interface and other sensory elements can help the users better perceive the application's functioning, and stimulate curiosity and attention due to its overall visual attractiveness. The Richness and Control factor was also considered an important factor, because they found out that users feel the need to be "in charge" over their experience with the application. Attfield et al. (2011) and O'Brien & Toms (2008) also identified the perceived usability as a factor of engagement, as an easy-to-use application is more likely to avoid users becoming confused and frustrated and stop using it, which can be included in the Aesthetics factor. All the authors attributed importance to Endurability, because they found that lasting positive memories of using the application were determinant in making the user repeat the usage and recommend the application to others, as well the

usefulness of the application for users. Reputation, trust and expectation was only discussed by Attfield et al. (2011), O'Brien & Toms (2008) and (2010), but it is also a relevant factor, as the trust given to a certain entity is seen to shape how likely the user is to assume the application's quality. Then, applications from companies that the users deem reliable are more likely to maintain high engagement.

Overall, although some factors are only discussed in a few articles, all of them present compelling reasons to be taken into account when evaluating user engagement, each with its own area of influence. However, to evaluate new apps, the last discussed factor– reputation, trust and expectation – probably shouldn't be taken into account, since a new app (and a new organization) likely hasn't created a steady reputation among users. Here, it is likely that this factor alone can be one-sided, being a strong contributor for mainstream apps, and completely absent for new apps.

2.6. Process of User Engagement

As stated earlier, engagement requires more than just task completion and it is strongly intertwined with emotional, cognitive and behavioural connections between the user and the resource. This type of connections doesn't happen all at the same time, and there is a studied process in which some factors contribute more to one stage than another, the Process of Engagement by O'Brien & Toms (2008).

This Process consists of four stages: point of engagement; period of engagement; disengagement and (possibly) reengagement:

- *Point of Engagement* – how engagement starts; authors O'Brien & Toms (2008) argued that the experience begins with the visual aspect of the interface, the novelty and the user context, which means their motivations and interests have to be in sync with the application context plus their desire and availability to experience this interaction with the application. It was also found that users often had their personal goals to initiate this process, either social or experience-based. The authors proposed in this stage to strive the aesthetics and novelty to get users' attention, motivation and interest in using the application.
- *Period of Engagement* – when the first stage succeeds and engagement continues; this stage refers to the users' ability to maintain their attention and interest in the application while having positive emotions. Beside this, several engagement factors have important roles during this stage, such as the control, awareness, the interactivity, challenge, feedback, aesthetics and novelty (O'Brien & Toms, 2008). As so, this stage marks the main part of engagement and what most of the literature about user engagement refers to.
- *Disengagement* – users lose their interest in the application and disengage, making a more passive use or maybe even stopping to use the application and disengage completely. This can happen with the negative emotions regarding some factors, such as the lack of challenge, novelty and interactivity, which will most certain decrease users' motivations and interests for using the application. Other frequent disengagement triggers were external ones, such as possible interruptions in the environment or issues with the technology.
- *Reengagement* – when users engage again with the same application after having become disengaged. This can happen in one session alone, where users disengage with the application and something happens that engages users again. The factors contributing to reengagement with more relevance are novelty, convenience and ease of use (Webster & Ahuja, 2006). O'Brien & Toms (2008) also found that this reengagement often came from users remembering successful experiences they had, in the past, with the application, or the emergence of something new, such as a product, feature or experience, that was unique to the application. Since engagement works in continuum, this reengagement is what will

make the users repeat the experience and engage multiple times; if not, they will simply disengage and not use the application again.

This process can be useful to understand how these factors generally contribute to the evolution of user engagement over time, and how some factors can have more impact to users than others in similar applications on a different stage of the process. That is, users that are already engaged with an application will give importance to some factors, while users that are testing for the first time have different needs, and so different factors come to play in that first stage. In a critical analysis of these divergences across the different stages, one can then presume that some factors will acquire more relevance to user engagement in new apps, when compared to those for apps that the user is already engaged with.

2.7. Research Gap

Although the analyzed literature on user engagement is substantially recent, the extreme importance of this concept has led several authors to exhaustively analyze its components and the factors that influence it. However, in all the literature review that was performed, not a single article focused on studying engagement in new apps comparing to mainstream apps. Such an analysis is becoming increasingly relevant, as some apps clearly dominate in specific categories – such as social, entertainment, productivity, games, etc. – but there are always new companies seeking to compete with these mainstream apps, launching new products into the market and fighting for users amidst a red ocean.

Also, as detailed during the literature review, user engagement has been found to be a structured process with various stages, and clearly not all applications can fit on the same stage at a given moment in time. This effectively means that the factors that present the most relevance for new apps will be found in the first stage – Point of Engagement – which will, in turn, not be true for mainstream or more mature apps, where users are often past this first stage and the most relevant factors relate to the latter stages of engagement.

To this extent, an analysis that focuses specifically on how user engagement is influenced in new apps versus what happens in mainstream apps can be a powerful tool for new app developers to design their product and communications. By doing so, they are framing reliable user engagement knowledge into their own product and strategy, in such a way that it promotes high user engagement and gives them a fair competitive advantage in the marketplace.

2.8. Research Question

General research question:

How can new social app creators/developers stimulate user engagement?

Specific research questions:

Which factor (or group of factors) can contribute more to engage mobile application users? Why and how is that possible?

How does existing literature on user engagement match the scenario for new apps?

How are users predisposed to try new apps?

Which factors of user engagement have the most relevance to new app users? Why?

How can engagement factors be combined to provide a competitive advantage to new apps in a market dominated by mainstream apps?

3. METHODOLOGY

3.1. Research Design

Given the nature of the research, it seems that either a quantitative research, qualitative research and case study research may all be suitable choices. A quantitative approach is suitable to uncover the most influential factors of engagement and the testing of relationships between variables, with statistical significance. Specifically, it could serve as a way of gathering a significant amount of data, relating engagement with the several factors found in the literature, and quantifying each relationship (Babbie, 2015). A qualitative research design allows a profound analysis on users' behavior regarding their engagement with mobile apps, gathering rich information that can help better explain how and why users behave in a certain way (Creswell, 2013). It could serve as a manner of evaluating each engagement factor with a great degree of depth, generating novel insights that may have not been found in previous literature, that can identify a specific context that was otherwise unaccounted for. A case study research design is often used in the business and psychology fields of study, due to the intention of understanding complex social phenomena, and to this method's ability to allow researchers to retain the meaningful and universal aspects of real-life events. It differs from other research methods specifically due to its ability to cover contextual conditions that are disregarded in quantitative and qualitative studies (Yin, 2009). As so, it could prove to be a valid research design to assess user engagement in new and mainstream apps with real-word conditions.

In order to answer which, how and why these factors have impact in user engagement, both quantitative and qualitative analysis were conducted. Given that the factors of engagement have already been extensively defined by the literature, but are framed in a time where mobile applications were still just emerging, the quantitative research aims mainly at confirming and selecting the main engagement factors that fit the current reality and applied to just one type of application (social). Focusing solely in one mobile app category (social) enables less entropy, due to the great differences between apps from different categories, which wouldn't enable a direct comparison of factors, as is argued by (Attfield et al., 2011). The social category was elected, among all others, since it represents the one that amasses the most users and, then, is more likely to be a reality for the present study's respondents (AppAnnie, 2016).

After the quantitative analysis has been conducted, its critical interpretation will enable the uncovering of which factors present the most significance to engagement with mobile social apps, in the current context. These will serve as the basis for a more thorough qualitative analysis, which will focus on extracting rich, insightful information on "how" and "why" users display certain behaviors and preferences towards new mobile social apps.

3.2. Procedures

3.2.1. Quantitative Analysis

Quantitative analysis focuses on gathering and converting data to quantifiable and easy to understand information. In this case, these analysis was conducted to understand if the factors referred in the literature were still valid in today's context, and how significant are they to user engagement nowadays.

To this end, an online questionnaire was constructed in Google Forms, with questions specifically aimed at evaluating users' overall engagement and specific engagement – behaviors toward each of the known factors of engagement – as well to gather some relevant demographic data. This type of questionnaires has great advantages in terms of time savings, presenting a more uniformed analysis, and enabling an easy conversion of raw data to an Excel file, and then to the software SPSS (Statistic Package for Social Sciences) file to be analyzed. However, these online forms also have disadvantages, such as not ensuring proper knowledge on the transparency and truthfulness of given answers, which then requires a data validation and editing process.

To overcome the incapacity and lack of motivation of the interviewee from answering the questionnaires, this form was planned to not extend more than 7 minutes and it contained only closed answer questions.

After this questionnaire was created, it was pre-tested with 10 people, and some alterations were made so that respondents could more easily understand and interpret all the questions. Then, the sampling was released through social media to collect the right target (social app's users) and was done during one week of August.

- *Questionnaires*

The goal of this analysis was to understand if the factors of user engagement were shown to influence mobile social app users' overall engagement, and to understand which ones were significantly more important to social app users in the current reality. So, it was necessary to construct some questions for each of the specific engagement factors defined in the literature, to uncover the extent of their present relevance. These factors needed to be compared to one dependent variable, and this variable was the general engagement. That said, different section was created, which included questions for users to evaluate how they were, overall, engaged with the current social applications they use.

The structure of the questionnaire had 4 main sections: I to IV.

The first - **Section I: Selection of Social App Users** – selected the respondents by the use of smartphone and social apps, excluding right in the beginning those who were not the right target user. This way, the following sections were answered only by social app users. This section included one question about the operating system they use (which corresponds to demographics) or if they don't use smartphone at all, and this question was in this section to filter out users who didn't have a smartphone to answer the following questions.

The second – **Section II: Evaluation of User Engagement** – had the goal of evaluating the general user engagement regarding their experience with their current social apps. For this, a 1 to 7 point Likert rating scale was created, with affirmations that had users to strongly disagree (1) or strongly agree (7) regarding their use of social applications. This may not directly translate to real engagement, but it is their perception of engagement and their real opinion about these social apps.

The third – **Section III: Evaluation of Factors** – was centered in evaluating if the factors defined by the literature were important and how much significance they had towards engagement with social apps. With this purpose in mind, 2 to 6 affirmations were built for each specific engagement factor, which had users to also strongly disagree (1) or strongly agree (7). Some factors are simple to understand and evaluate, and for that reason 2 or 4 affirmations were enough to reach enough consistency, only the factor "User Context" had 6 questions, because it encompasses a group of small factors, such as the motivation, interests and benefits.

The fourth – **Section IV: Demographics** – had the main goal of creating a simple profile of the respondent: age (divided in 4 intervals) and gender (feminine or masculine). Users' operating system was also considered in the demographics, since it has been shown that mobile users from different operating systems display significantly different behaviors and preferences (Benenson, Gassmann, & Reinfelder, 2013).

The complete questionnaire is presented in Appendix A.

In order to ensure the data was suitable for the analysis and the questionnaire was not biased, the affirmations used were diverse and some scales were reversed, from positive statements to negative statements. This helps ensure that careless responding, acquiescence and confirmation bias were all identifiable when analyzing each respondent's answers, and is a practice supported by the literature (Weijters, Baumgartner, & Schillewaert, 2013).

The final results of this questionnaire were exported from Google Forms to a Microsoft Excel spreadsheet. According to the guidelines by Iacobucci & Churchill (2010) and Shiu (2009), all obtained answers were, then, screened for signs of incompleteness, contradiction and fraudulence, such is the case if one respondent answers "Yes" to all the questions. During this analysis, false data (people who respond randomly) was eliminated, as was the case with answers from respondents that were not included in the targeted audience (those who don't use social apps or don't have a smartphone). After all the data was meticulously validated, it was imported to the program SPSS for statistical analysis.

As the first step of the analysis, it was needed to invert the reversed scale variables (3.b); 4.c); 4.g); 4.m); 4.o); 4.p); 4.s); 4.u) and 4.y), making a linear transformation of each variable using the “Recode into Different Variables” command in SPSS (value 7 converted to 1; 6 to 2; 5 to 3; 4 remained 4; 3 to 5; 2 to 6 and 1 to 7).

The section II of the questionnaire allowed to perceive the overall user engagement through different perspectives. Since a single overall engagement variable was intended to act as a dependent variable, the simple mean of the results from the four questions that assessed overall engagement was calculated and coded into this overall engagement variable, labeled as ENG.

Similar to the section II, the factors studied in section III were also analyzed by several questions each, so a single variable was calculated from the simple mean of the correspondent answers, as shown below:

- Focused Attention was evaluated by 4.a) and 4.b), creating the variable FA;
- Positive Affect included 4.c), 4.d), 4.e) and 4.f), creating the variable PA;
- Aesthetics included the affirmations 4.g) and 4.h), which originated the variable AES;
- Endurability was evaluated by 4.i), 4.j), 4.k) and 4.l), making the variable END;
- Novelty included 4.m), 4.n), 4.o) and 4.p), creating the variable NOV;
- Richness and Control included 4.q), 4.r), 4.s) and 4.t), forming the variable RC;
- Reputation, Trust and Expectation contained 4.u), 4.v), 4.w) and 4.x), which created the variable RTE;
- User Context was evaluated by the last 6 questions 4.y), 4.z), 4.aa), 4.bb), 4.cc) and 4.dd), which form the variable UC.

Answers relating to demographics also needed to be converted, this time to a categorical variable. As so, the Age, Gender and Type of Platform answers were converted to categories, making the variables AgeCAT, GenderCAT and PlatCAT.

After finally transforming and creating the variables, this data was first assessed for the internal consistency of Likert scale items, through the calculation of the Cronbach’s alpha value (Cronbach, 1951), which gives information about the reliability of the data under study (Tavakol & Dennick, 2011).

As Likert scale variables were converted, through their simple mean, to individual numerical variables – which has been discussed by Norman (2010) as a suitable approach for analysis, especially since the chosen scales range from 1 to 7 and are equally spaced – a linear regression analysis was seen as a suitable statistical approach. This linear regression allowed the understanding of correlations between the individual engagement factors – independent variables – and the overall engagement – dependent variable. It not only allowed to see which factors are significant towards the model, but in which relative weights do they contribute to overall engagement. Multicollinearity issues were also assessed, as they present adverse effects to the interpretation of results and may give rise to pitfalls, by evaluating the variance inflation factors (VIF) (Farrar & Glauber, 1967; Mansfield & Helms, 1982).

With the results of this analysis, a selection of the factors which were shown to be significant were made, and those were selected as the factors to be considered in the qualitative part of this study.

3.2.2. Qualitative Analysis

To understand how engagement can be influenced in new apps, it was necessary to see how current popular social apps engage their users and which factors are more relevant to users. The results of the quantitative analysis allowed to understand that, and supported the structure of this qualitative analysis. The qualitative research methodology was followed according to the guidelines by (Silverman, 2016).

This qualitative research was conducted through interviews. This method enables individualized talks, where the respondent is free to give an answer that goes in line with his own thoughts, and permits the researcher more flexibility in asking further questions to take the subject to a deeper level. With this in mind, an interview regarding the use of new social apps was structured. Since qualitative analysis relies on obtaining deeper data with rich insights, almost all the questions were open-ended, so users would be given

freedom to answer with their true opinions, and justify them comprehensively. Interviews were designed and conducted as per the suggestions of (McNamara, 2009).

Some of the interviews were conducted by Skype call or personally (8 respondents), but the great majority of the respondents couldn't answer this way, so the questions were sent by email (16 respondents). Once people by writing tend to answer very poorly, the questions needed to be more specific to understand the weight and importance of each selected factor. Some other questions were broader, to see what respondents prioritize and give more importance to, when asked about experiencing new social apps. Although personal, face-to-face interviews seem to be the norm in qualitative research, interviews conducted via Skype call and even email have been shown to be suitable alternatives, with few significant downsides (Hanna, 2012; Meho, 2006). The full interview is presented in the Appendix B.

The answers were all converted to a word file and added to a new project in the program NVivo, and analysis within this software was performed in light of the instructions by (Bazeley & Jackson, 2013). In this program, each answer of each interviewee was analyzed, and coded in order to enable and interpretation of the data with keywords and relationships between them. Each new finding in the answers of the interviews was highlighted and connected to a new specific node (code) regarding the topic. When new topics were found that were already coded to a node, they were simply connected to that existing node.

This coding was valuable to organize the different ideas and opinions of interviewees, allowing to see which factors were mentioned and the overall relative weight each of them had. This kind of analysis also allowed to see the more frequently words said by the interviewees, which can be valuable to see the aspects that users want or need the most to experience new social apps.

The codes were grouped into categories in order to enable a better understanding of the meaning of these specific codes and answer to the main questions of the research. This relationship and categorization is described below, the majority fitting into the denomination of the factors referred in the literature:

- *Novelty*
 - Updates
 - Innovation
 - Light Technology
- *Endurability*
 - Repetition of use
 - Recommendation
 - Interactivity
 - Utility
- *Type of Use*
 - Current Use
 - Active use
 - Passive use
 - Time Spent
- *Emotions*
 - Reflection
 - Fun
 - Enthusiasm
 - Curiosity
 - Entertaining
- *RTE*
 - Reputation
 - Trust
 - Expectation
- *Users*
 - Motivations
 - Interests
 - Friends Using

- *Layout*
 - Visual Aspect
 - Perceived usability
- *Challenges*

This denomination helped to structure and better understand the respondents' answers, while linking to the factors referred in the literature.

4. ANALYSIS OF RESULTS

4.1. Quantitative Analysis

This chapter contains the results from the quantitative analysis and an interpretation of these, which will be of the utmost importance for the second phase of the research – qualitative analysis.

The questionnaire recorded 164 total answers, however, several of these answers were not valid due to careless responding, or not matching the intended target user. Due to this, the total number of answers decreased to a total of 133 appropriate ones.

From the analysis of demographics, it can be seen in **Figure 2** the percentages of respondents' profiles. The majority was between 14 and 23 years, with 87% of the respondents being younger than 36 years of age, which can be explained by the sampling that had been done in social media and reached younger people. However, while this might be seen as a limitation, it actually goes in line with current statistics on social apps demographics, that show that over 60% of social app users are younger than 35 (Chaffey, 2017). Regarding the operating system of the respondents' smartphones, the majority was Android, with 56%, and Windows Phone had the least percentage of users, with only 5%. A total of 62% of the respondents were feminine and 38% masculine, which can be seen as balanced and not of significant differences.

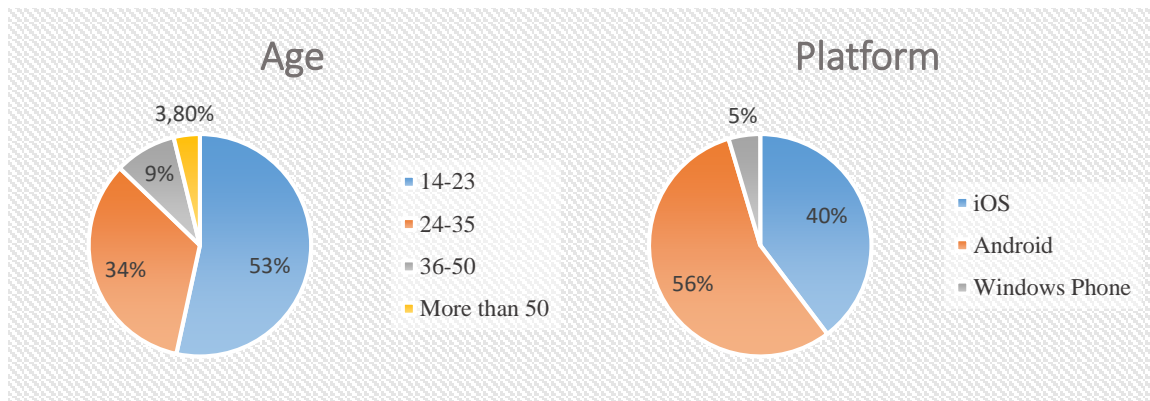


Figure 2. Percentage of respondents' profile regarding their age and type of operative system in their smartphones.

The Cronbach's alpha analysis in **Table 2** provided an assessment of the overall internal consistency of the Likert scale questions. The results of these analysis showed a Cronbach's alpha value of 0.785, which can be interpreted to mean that the used scales possess high internal consistency, as it stands above the 0.70 threshold, considered to be "acceptable" for social science research (Nunnally, 1978).

The Cronbach's alpha can be higher in some cases where items (variables) are deleted from the analysis, which is presented in **Table 3**. The last column of this table shows which are the variables that can lead to this type of result, which in this case are: NOV (Novelty) and RC (Richness and Control). The removal of these would lead to a small improvement in Cronbach's alpha and it should be considered removing these or not. Except these two variables, the removal of any other variable would result in a lower Cronbach's alpha, thus these should not be deleted from the analysis.

Table 2. Cronbach's Alpha Test of the variables with Likert scale (ENG, FA, PA, AES, END, NOV, RC, RTE and UC).

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,785	,766	9

Table 3. Cronbach's Alpha values if Items deleted.

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ENG	39,7600	27,173	,760	,719	,716
FA	39,9760	24,463	,720	,738	,720
PA	39,8960	29,217	,660	,539	,735
AES	39,8480	32,318	,354	,145	,782
END	39,5360	28,863	,729	,580	,726
NOV	41,0880	38,496	-,054	,131	,830
RC	38,9153	39,434	-,103	,087	,813
RTE	40,0460	33,462	,571	,376	,759
UC	39,9747	31,486	,638	,560	,746

With the main objective of evaluating user engagement through the prompting factors under investigation, a linear regression analysis was conducted in SPSS, placing overall engagement as a dependent variable and engagement factors and demographics as independent variables. Linear regression results are presented on **Table 4**, **Table 5** and **Table 6**.

Table 4. Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,854 ^a	,729	,703	,70050
a. Predictors: (Constant), GenderCAT, AgeCAT, PlatCAT, RTE, PA, END, FA, UC, RC, NOV, AES.				

Table 5. ANOVA Test

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	149,501	11	13,591	27,697	,000 ^b
	Residual	55,449	113	,491		
	Total	204,950	124			
a. Dependent Variable: ENG						
b. Predictors: (Constant), GenderCAT, AgeCAT, PlatCAT, RTE, PA, END, FA, UC, RC, NOV, AES.						

From the model summary in **Table 4**, the adjusted R square can be useful to explain how the overall engagement is affected by demographics (GenderCAT, AgeCAT and PlatCAT) and the factors referred in

the literature (RTE, PA, END, FA, UC, RC, NOV and AES). The model fits the data well with an adjusted R^2 of 0.7. This means the model can explain 70% of the variance, which is seen as a strong effect (Moore, 2010). By analyzing the ANOVA test results in **Table 5** it can be concluded this model is significant and fits the data well.

Table 6. Coefficients Test with the dependent variable ENG (Engagement) and demographics and factors as independent variables and a collinearity test between the factors.

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
Constant	2,350	,904		2,600	,011		
AgeCAT	-,189	,093	-,118	-2,038	,044	,709	1,410
GenderCAT	-,021	,134	-,008	-,159	,874	,904	1,107
PlatCAT	,016	,125	,008	,129	,898	,652	1,534
FA	,426	,064	,549	6,650	,000	,351	2,848
PA	,241	,079	,221	3,056	,003	,458	2,183
AES	,044	,056	,043	,790	,431	,803	1,245
END	,193	,090	,170	2,150	,034	,381	2,623
NOV	,137	,060	,120	2,303	,023	,881	1,135
RC	-,247	,100	-,127	-2,476	,015	,917	1,091
RTE	,064	,106	,038	,607	,545	,624	1,602
UC	-,167	,103	-,121	-1,621	,108	,429	2,331
a. Dependent Variable: ENG							

Results from the linear regression analysis presented in **Table 6** above provide a specific view on how each independent variable impacts the overall user engagement. As so, the variables that contribute to the model are AgeCAT, FA, PA, END, NOV and RC (highlighted in **Table 6**), with 95% confidence. A deeper analysis on each significant factor is presented below.

Age contributes to the model with a significance of 0.04 and the standardized coefficients Beta is about -0.12. This negative value means that age contributes negatively to user engagement, so, in other words, younger users seem to display higher engagement levels than older users.

Focused Attention was shown to be the most important factor contributing to engagement, with a significance of 0.0 and a Standardized Coefficient Beta of 0.55. In this analysis, users showed that they spend a significant amount of time using social apps, which seems to be the highest driver in terms of explaining user engagement in social applications.

Positive Affect displayed a 0.03 significance, having the second highest positive impact on user engagement (standardized Coefficient Beta of 0.22). Users confirmed that the transmitted emotions were important when using social applications, which was useful to understand if people were affectively involved with their current social applications. This analysis showed the people with higher engagement levels were also affectively involved in social applications.

With a significance of 0.03 and an impact of 0.17 in the overall engagement, Endurability was shown to be one of the factors that has a significant importance to the dependent variable. From the answers of the questionnaire, it can be said users tend to recommend their social apps, but also that they value an easy and very quick access to them.

Novelty also showed importance among users, with a standardized coefficient beta value of 0.12 and significance of 0.023. Users seemed to feel that new features in social applications are important to them and give them curiosity to explore.

The factor Richness and Control presents a significantly negative impact, which appears to point out that richness and control in social applications are important, but the more richness and the more control on the apps, the worse for users' engagement. This result was unexpected and contrasts findings in the literature, where this factor was considered positively important to user engagement.

With the multicollinearity test between the factors also presented in **Table 6**, it could be concluded that the factors don't influence each other and they are found to be independent amongst each other, since the VIF values all fell below 5 (Akinwande, Dikko, & Samson, 2015).

After going through each factor that exhibited significance towards overall user engagement, a critical analysis of which factors should be considered for the consecutive research is paramount. Here, since age had a very predictable result and is a simple factor of demographics, it can be important to better define the application's target user, but it will not be an essential factor to study during the next phase. Also, Richness and Control was shown to have an effect that contradicts that from the literature, so this could mean that the questions regarding this specific factor could be unclear or biased to evaluate real impact of this factor. Besides, with Cronbach's alpha analysis, this variable presents a very low value of correlation in **Table 3**, which indicates this variable should be deleted to have a more consistent and reliable analysis. Because of this, results from this factor need to be better studied to understand if this values were wrong or if they could mean a different behaviour and preference from users in the current reality. This said, the factors selected to the next phase of analysis were the Focused Attention, Positive Affect, Endurability and Novelty.

4.2. Qualitative Analysis

The respondents' answers were converted to codes and categories, which allowed to create a structure of the user engagement factors and sub-factors that have real influence regarding the use of new social applications. This structure is presented in **Figure 3** and allowed a broader view on how user engagement can be generated or improved.

This analysis also allowed to see the more frequent words in the interviews, presented in **Figure 4**, which was useful to generally perceive the tendency and major concerns of users regarding their experiences on new social apps. This was a general approach to understand not only the important factors, but specific things users need and want when experimenting new social apps, such as "friends", "features" and "active use". These main keywords overall specify which aspects users are more keen on. If their friends are also using the app, they can socialize with them, and this acts as a positive engagement trigger. New features that differentiate the application from the other ones, and the app's ability to motivate users towards exhibiting active usage were both major references in terms of engagement prompts.

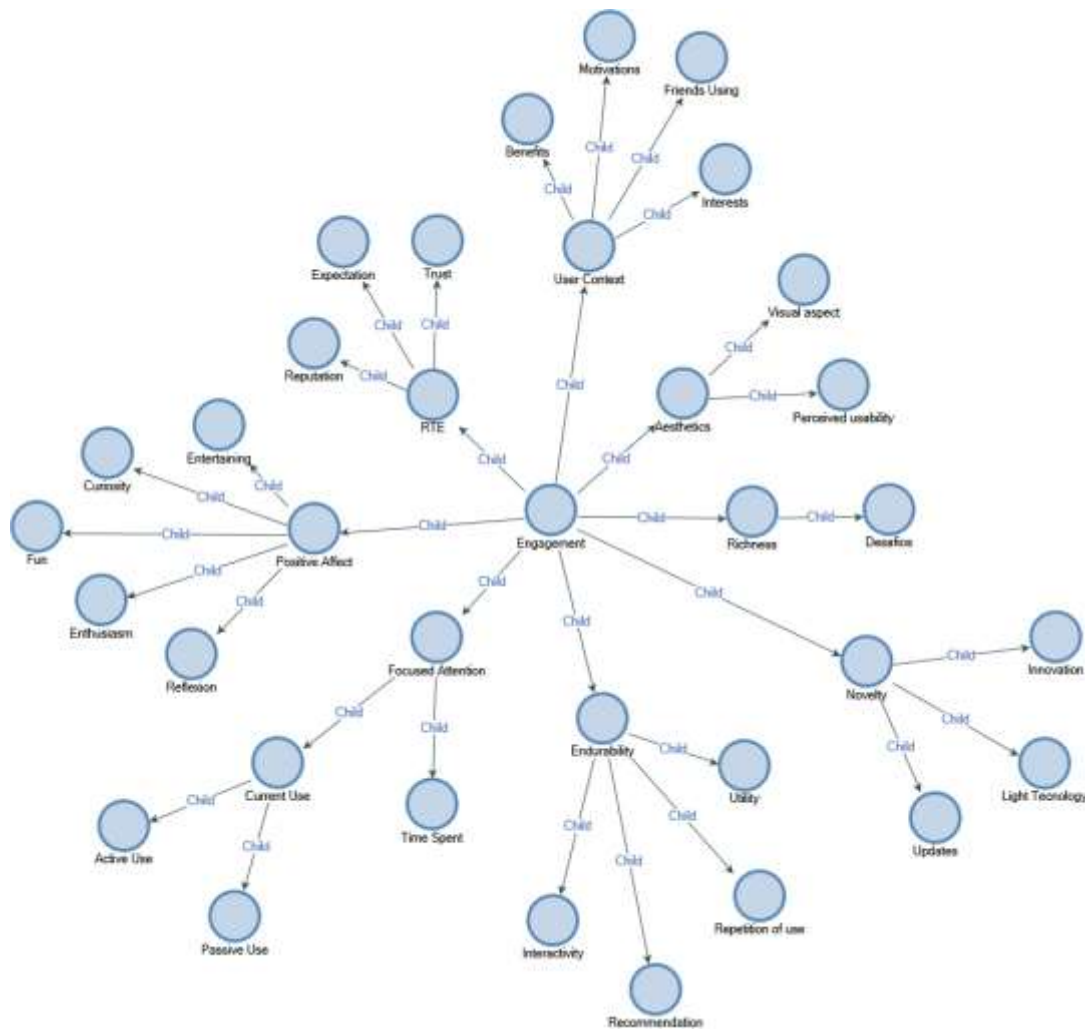


Figure 3. Map of user engagement factors' relationships regarding the use of new social applications.



Figure 4. Word Cloud with most frequent keywords in the interviews.

4.2.1. Most Referred Factors

From the quantitative results and the structure of the interviews, it was expected that the main factors that were selected through the quantitative analysis were going to be most often referenced by users. However, regarding the experience of trying and engaging with new social applications, users' responses seemed to point out that the most relevant factors for new apps were not the same as those of the mainstream apps.

When comparing nodes by the number of references by the interviewees, "Friends Using" has 22 references, "Innovation" has 21, "Reputation" has 14, "Interests" has 13 and "Repetition of use" has 12. If considering the group of nodes as a whole, the most referred factor is "Users", which can be considered to be regarding the literature factor named "User Context", containing a total of 44 references by the respondents. "Endurability", "Novelty" and "RTE" are the most referred and, consequently, considered more important to users when using new social applications.

- *Users*

This factor was the most referred by the interviewees, with the node "Friends Using" with 22 references, "Interests" with 13 and "Motivations" with 8.

In the interviews it was noted that the majority of the users considered that having friends also using the same applications was very important and acted as a trigger to use the app. In the open question about what is needed for users to maintain their interest in a new app, almost every interviewee said having their friends also using it was essential because, besides their need to maintain contact with friends, the resulting interactivity with friends will be a significant contributor to their predisposition to use the app actively.

The interests and motivations were similarly referred by the interviewees, and were shown as being the main drivers behind their willingness to try a new social application. They confirmed that they only would try new applications if they were of their personal interests or they would have a motivation to use it, like using it as a professional tool. This factor proved to be one of the most important, mainly acting to keep users interested in actively using the app. The absence of this factor seems to be one of the main reasons behind users disengaging, and even completely stop to use the application for good.

- *Endurability*

The interviewees overall made 30 references to conditions related to Endurability. Amongst these, repetition of use had 12 references and the utility and recommendations had 9 and 8, respectively.

The repetition of use of new apps shows that users seem to be predisposed to be active and regularly use the app, which is related with the factor Focused Attention (active use). Apart from that, it also indicates that when regularly opening and using the app, they prove that they remember their experiences using the new app, want to repeat them and are loyal to that application. The recommendations were also related to this, since when users repeatedly use an application, they tend to recommend it, and all the good experiences, to their circle of friends.

The utility was more referred in the questions about what a new app needs to convince them to try it. Most of the users said they would not try a new app just for nothing, as they would have to see something useful in the app, such as being able to perform functions they need or want. Some people also referred that there are currently so many applications, that most of them seem meaningless or it is just too hard to compare those who are useful to them to those who are not.

- *Novelty*

The Innovation node was the second most referred, with 21 references, and Updates had 5 references by the interviewees.

This factor is one of the obvious main characteristic of the new social applications. The novelty includes innovation - new features that present something disruptive, exciting, out of the box, and new applications tend to start from being at least a little different from the other ones. This differentiation is the innovation they can pass on users, and this analysis results showed this is important as a part of the User Context factor.

In the interviews, it could be noted that users are apprehensive to try new social applications, and unless there is something new and exciting in the app, they will not be willing to try it. Users explained that if the app does something alike or very similar to another mainstream app, they would not even consider trying, which shows that innovation inside the application is essential for users to reach the point of engagement, from where the cycle of engagement truly begins.

Application updates were referred as a relevant aspect to maintain users interested using the app over time. As was the general agreement, if the app doesn't show growth and evolution, users will be bored and lose their interest in using the app actively, or even leave the app altogether.

- *RTE (Reputation, Trust and Expectation)*

Within this factor, Reputation had the most references, with a total of 14, Expectation and Trust had 6 and 3, respectively.

The reputation was referenced over the answers, with some users considering that, in order for them to try a new app, it was important to be assured it came from a reliable source, which provided them with enough trust to try it. This issue has been addressed in some research, from the perspective of application security, risk and permissions (Chia, Yamamoto, & Asokan, 2012). Some other users said the reputation is relevant just to know the existence of the new app, otherwise they would not be using the new application, simply due to not knowing it existed.

This factor appears to be harder to achieve by new apps, since most of them are starting from scratch, with no previous reputation, and are required to put great effort to leverage their trustworthiness by creating a solid branding, history and user base. These and several other extra efforts are required for a new app to quickly grow a good reputation and inspire trust on their users. Only so will they be able to grow their user base and stimulate engagement with the app.

4.2.2. Final Discussion

Regarding new social applications, the perspective of real social app users enables to understand that the factors that have been studied in the literature are important to explain user engagement, but not all of them display the same impact.

The several interviews that were conducted allowed to understand which factors have more impact on the point of users' engagement, which ones on maintaining the engagement (period of engagement) and even why some factors have an effect on the disengagement.

The point of engagement, when users start their engagement within the new app, was shown to be more significantly influenced by Endurability, Novelty and Reputation. This first stage of user engagement can be very difficult to achieve, because users don't really know the app until they try, and they mostly only try it when they are recommended by someone or see utility and/or innovation in using it. The app's own reputation seems to also be a strong contributor for reaching the point of engagement factor, but acquiring some reputation is not an easy task for a new app: first the app needs to have some users trying it, and having a good enough experience, which is also a challenge by itself. The factor concerning Users was also seen to play a relevant part in reaching the point of engagement, as users tend to evaluate their willingness to try an app based on how likely they are to interact with their friends, and how closely it matches their own interests and motivations.

The period of engagement can be one of the harshest stages for new apps, simply because of the usual lack of a significant user base, unlike the reality of mainstream apps. As users clearly state their need to have their friends on the same platforms, or somehow being able to interact with them, new apps should focus on providing a good enough experience to grow their user base. As the relevance of the factors Users and Friends using was unanimous among most respondents, an app's ability to deliver some interactivity between users will have a strong contribution towards ensuring an active usage, and grow app interest and user engagement over time.

Some factors, when in absence, may be critical and ultimately cause the disengagement of users. The interviewees referred that not having friends to interact with, or new and active content to engage with

in the new app would be major drivers of their loss of interest, and would likely mean they would stop using the app.

5. CONCLUSION

The main goal of this study was to define the most relevant factors that enable new apps to compete with mainstream apps and help app creators/developers stimulate their user engagement from the very beginning. The literature review resulted in defining which factors influence user engagement in general and how the process of engagement occurs, but the user engagement in new mobile applications in particular seemed to have a lack of information.

This research can be of significant value to literature surrounding user engagement, as it addresses a specific aspect that is commonly neglected – new apps *versus* mainstream apps. By comparing these two scenarios, this research's results can shed some light into how users engage specifically with new apps, and present a series of considerations that new app developers can take into account when designing their apps in order to compete with popular apps. This can hopefully help them grow their user base significantly, and attain a fair fighting stance in a market dominated by giants.

With the quantitative analysis' results it was possible to select the factors referred by the literature review with more importance to social apps among users in the current reality. Results showed that the most contributing factors to engage social apps' users are the Focused Attention, the Positive Affect, Endurability and Novelty. Users confirmed that they passed a long time focused on social applications and even lost track of time; they lived good moments when using them; they recommend and remember enjoyable experiences about their social apps and they also consider that new features and updates are essential to maintain them interested and motivated in using a social application.

From the qualitative analysis, it was possible to see that the literature does not match the reality when it comes to new social applications. The interviewees considered others factors more important, such as the User Context, Endurability, Novelty and Reputation, Trust and Expectation. The User Context was the most relevant because the new app's content need to be in sync with their interests and motivations, but also having a large user base or at least having their friends using it too. This happens as they would just keep being active in the app if there was interactivity between people. The Endurability was considered important because users want to use an app actively and repeatedly if it presents some utility for them, as they also consider trying new applications if someone recommends it. This factor is related with Reputation, since users consider more easily to try new social apps if the app has some reputation, giving them more trust and confidence to experiment. The innovation was also referred as essential for users to try new apps, with new and exciting features being one of the main drivers behind them trying a new application.

Overall, users showed to be predisposed to try new social apps as long they match their interests. However, to keep users actively engaged over time, the new app has to have most of the factors referred above.

In order for new apps to compete in a market dominated by mainstream apps, they need to incorporate all these important factors as fast as possible. New app developers should take into account some factors that need to be massively present in the beginning, to reach the point of engagement with as many people as possible, and then focus on other factors that are better to maintain users active. Since the most referred factor by the interviewees was "friends using", and it takes time to grow a large user base, a viable and sustainable growth strategy seems to be by directing user acquisition through communities, so as to ensure that not a single user is left alone trying the app, but users are experimenting it along with their friends inside the community. The innovation aspect was also considered essential to users, which can be achieved by developing new but also fun and exciting features, that encourage them to be actively using the application. Disruption and innovation seem to be at the heart of many start-ups already, so they just need to incorporate that into the product, and not be afraid to test these innovative features if all pieces seem to fit together. These seem to be the very first two steps every new app developer and start-up should take, to ensure they can challenge mainstream apps' dominance over an ever-changing market.

5.1. Limitations and Future Research

During this study, there were some limitations that should be considered when addressing the research design, and could serve as insights for future research.

In the questionnaires, for the quantitative analysis, the users' perception of engagement may not match their real engagement. This variable was evaluated by questions that may have been misunderstood or devalued by users, due to the different perceptions of time and engagement among the users. This difficulty was found as well in the evaluation of the factors. To partially address this limitation, several questions about the same topic were made, which were then combined into a single factor, by calculating the simple mean. This partial solution was to somewhat eliminate misunderstandings, but also to reduce the differentiation among users' perception of factors.

Still regarding the evaluation of the factors, the questions needed to be specific in order for users to respond more easily, but some factors were difficult to convert into questions. As so it is possible that the questions did not correspond to the entirety of the factor and some characteristics were left out, or that respondents were confused or biased towards a specific answer.

The major limitation of this study was the low rate of response to the questionnaires for the quantitative analysis. In order to have more significant results about the user engagement's factors, a higher rate of responses should be had. This would help ensure a dependable interpretation on mobile users' engagement in social apps for the current context, which will serve as a proper basis to evaluate these factors specifically for new apps.

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7. APPENDICES

7.1. Appendix A

SOCIAL APPS QUESTIONNAIRE

“I need your cooperation!

I am conducting a questionnaire within the scope of my Master's thesis on Innovation and Entrepreneurship (University of Porto). The goal is to understand the opinions of social apps' (such as Facebook) users, regarding the factors they value the most.

Your answers will help developers of new social apps create better-quality applications that match your habits and preferences.

There are no text responses. All are multiple choice. The approximate length of the questionnaire is 5 minutes.

Please read all the questions carefully before submitting. Answer with the utmost truthfulness.

All responses will be treated as confidential.

Thanks for your cooperation!

Monica Leiras”

*** Required**

SECTION I - SOCIAL APPS QUESTIONNAIRE – SELECTION OF SOCIAL APP USERS

1. Which operating system does your smartphone have? *

Mark only one oval.

☐ Android

☐ iOS

☐ Windows Phone

☐ None (I don't have a smartphone) *After the last question in this section, stop filling out this form.*

2. Do you use social apps on your smartphone? *

Mark only one oval.

☐ Yes

☐ No *Stop filling out this form.*

SECTION II - SOCIAL APPS QUESTIONNAIRE – EVALUATION OF USER ENGAGEMENT

3. Rate, on a scale of 1 to 7, your agreement with the following statements: *

Mark only one oval per row.

	1 - Strongly disagree	2	3	4	5	6	7 - Strongly agree
a) Social apps are an important part of my life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) I don't spend much of my time using social apps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I feel addicted to the social apps I use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I feel engaged by the social apps I use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION III - SOCIAL APPS QUESTIONNAIRE – EVALUATION OF FACTORS

4. Rate, on a scale of 1 to 7, your agreement with the following statements: *

Mark only one oval per row.

	1 - Strongly disagree	2	3	4	5	6	7 - Strongly agree
a) When I'm using social apps, I lose track of time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) When I'm using social apps, I lose focus on what's going on around me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) I have no fun when using social apps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I feel that I spend good times when using social apps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) When I'm using social apps, I am smiling most of the time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) I most frequently use social apps that make me smile.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) I don't care about the visual aspect of social apps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) I prefer to use social apps with more appealing visuals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) I would easily recommend the social apps I use to my friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) I would be disappointed if I could no longer use the social apps I'm on right now.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) I keep social apps in the easiest place to access on my smartphone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l) I don't usually disable notifications for my social apps, in my smartphone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m) I don't like it when a new feature is released in the social apps I use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n) I feel curious to explore the different features of social apps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o) It is important that social apps are familiar to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p) I am disoriented when there are changes in the social apps I use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q) I prefer social apps that give me great control over privacy settings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r) I value social apps that allow me for a greater freedom of choice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s) I don't care if a social app doesn't inform me on how they will use my data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t) I like it when social apps give me several possibilities on how I can use them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u) I feel difficulty to trust the content I find on social apps.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v) I feel it's easier to trust social apps with higher reputation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

w)	When I have high expectations on a social app, I feel I will use it more often.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
x)	The social apps I use are the ones I trust the most.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
y)	I would consider trying a social app outside my interests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
z)	I don't consider using social apps that are not used by my friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
aa)	It is likely that I stop using a social app if my friends don't use it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
bb)	There are social apps I only use in specific situations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
cc)	There are social apps I use more frequently on specific situations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
dd)	Trends influence me to use some social apps more than others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ee)	I more often use social apps that are compatible with my personality.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION IV - SOCIAL APPS QUESTIONNAIRE – DEMOGRAPHICS

5. Age *

Mark only one oval.

- ☐ 14-23
- ☐ 24-35
- ☐ 36-50
- ☐ More than 50

6. Gender *

Mark only one oval.

- ☐ Male
- ☐ Female

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7.2. Appendix B

INTERVIEWS GUIDELINE – QUALITATIVE ANALYSIS

Have you tried any new social application?

If answer is no:

Why not?

If answer is yes:

Which one?

How long ago?

What made you try this new app?

When deciding to try new social apps, do you consider the emotions that the app can pass on?

Which emotions?

How frequent did you open the app?

Have you recommended that new social app to your friends?

Have you tried that app because of the new features?

Do you still use the app?

If answer is no:

Why did you leave the app?

During the time you use it, did you use actively or passively?

Did you feel that the type of use was one of the factors that contribute to leave the app?

If answer is yes:

What maintained you interested in using the app?

Did you maintain interest in the app because it was launched with new features over time?

Final Section:

What is needed in a new social app to convince you to try it?

What needs to happen to make and maintain you interested in using a new social app over time?